The Relationships among Structural Social Support, Functional Social Support, and Loneliness in Older Adults: Analysis of Regional Differences based on a Multigroup Structural Equation Model

Haifeng Li[a]* and Cong Wang[b]

[a]*School of Psychology, Fujian Normal University, Fuzhou, China;* [b]*Fuzhou Hualun Middle School, Fuzhou, China*

Author Note

Haifeng Li: https://orcid.org/0000-0002-8370-4868

This work was supported by grants from the National Social Science Foundation of China (16CSH047).

Correspondence concerning this article should be addressed to Haifeng Li, Fujian Normal University, 1 Keji Road, Minhou District, Fuzhou, 350117, China. Email: lihaifengqiqi@163.com. Tel: 86-17805930972.

The Relationships among Structural Social Support, Functional Social Support, and Loneliness in Older Adults: Analysis of Regional Differences based on a Multigroup Structural Equation Model

Abstract

Objective: This study investigated the relationship between structural social support and loneliness and explored whether functional social support had an intermediate role therein. It also employed a multigroup structural equation model to compare mediation models among older adults living in urban, town, and rural areas.

Methods: Using a self-made demographics questionnaire, the structural-functional social support scale, and the 3-item UCLA loneliness scale, this study collected information from 1,325 older adults identified via convenience sampling.

Results: The results showed that: (1) urban and rural elderly had higher structural social support and experienced less loneliness than those of town elderly, whereas the difference of functional social support among urban, town, and rural elderly was not significant. (2) An analysis of the models of regional differences indicated that functional social support served as a full mediator in the relationship between structural social support and loneliness in urban elderly, and a partial mediator for older adults living in towns and rural areas.

Conclusion: The relationship between structural social support and loneliness is mediated by functional social support, and this mediation model varies between urban and town/rural elderly. This study helps us understand possible

mechanisms through which structural social support impacts loneliness. It suggests that nursing strategies for older adults should be adjusted according to region and direct greater focus on the function (or quality) of social support network and on town elderly.

Keywords: Structural social support, Functional social support, Loneliness, Regional difference, Older adults

Introduction

Loneliness refers to situations in which a person feels distress, depression and disengagement due to a lack of social or emotional life (Killeen, 1998). Loneliness in older adults is associated with a decline in body function and increase in mortality (Cacioppo et al., 2002; Holwerda et al., 2012; Perissinotto et al., 2012). It is also closely related to the level of depression, psychological distress, and anxiety (Cacioppo et al., 2015; Golden et al., 2009; Paul et al., 2006).

Social support is a factor protecting against loneliness (Chen & Feeley, 2014; Chen et al., 2014; Golden et al., 2009; Zhang & Silverstein, 2020). It can be evaluated from structural (i.e., quantity) and functional (i.e., quality) aspects. Structural support[1] refers to the existence and quantity of social relationships within an individual's social network (Sherbourne & Stewart, 1991). The density and size of one's social network and frequency of social contact can be used as indicators of structural support (Gallo et al., 2015; Green et al., 2001; Heylen, 2010; Stokes, 1985). Functional support is often conceptualized as the perceived availability of support resources, such as material aid, emotional support, companionship or information, from one's social network if needed (Gallo et al., 2015; Lakey & Cohen, 2000; Lehto-Järnstedt et al., 2004). Sometimes, functional support is also measured by one's satisfaction with the support available (Davidson et al., 2016).

---

[1] For simplicity, structural social support and functional social support are referred to as structural support and functional support respectively.

The convoy model of social relations provides one theoretical basis for this study to investigate the impact of social support on loneliness. According to the convoy model, individuals are surrounded by supportive others who vary in their closeness, e.g., family members, other relatives, friends, neighbours, and co-workers (Antonucci et al., 2014). These members not only constitute a support network for the elderly, but also provide the elderly with many kinds of social support (e.g., aid, affect, affirmation exchanges). Therefore, many studies have shown that both structural and functional support can effectively alleviate loneliness in older adults (Cheng et al., 2010; de Jong-Gierveld et al., 2015; Green et al., 2001; Heylen, 2010; Kemperman et al., 2019; Pinquart & Sorensen, 2001; Sherbourne & Stewart, 1991; Writtenborn et al., 2020). For example, a meta-analysis of 149 articles published from 1948 to 1999 found that both the quality and quantity of social networks were closely related to loneliness (Pinquart & Sorensen, 2001). Data from 1,414 adults over age 55 in Belgian showed that both the structural (as measured by contact frequency with friends, family, and acquaintances living outside the household and the number of good friends) and functional (as measured by satisfaction with each of the personal social contacts) social relationships significantly affected social loneliness (Heylen, 2010). Study on nursing home residents in Hong Kong found that frequency of contact and functional support (as measured by confiding, showing affection, and advice and guidance from family, other relatives, friends, and staff and fellow residents) were associated with loneliness (Cheng et al., 2010). Another study of 3,799 respondents over age 65 in Canada found that social network size and

composition and satisfaction with network contacts were found to be related to loneliness (de Jong-Gierveld et al., 2015). Therefore, this study proposed the hypothesis (a): structural and functional support were negatively associated with loneliness.

In addition, according to the convoy model, it is clearly necessary to have some quantity of relationships if one is to have high-quality relationships or to receive different support resources (Antonucci et al., 2014). Hence, it can be predicted that individuals with higher structural support are more likely to have higher functional support. Montes-Berges and Augusto (2007) used Vaux's subjective social support scale to measure the functional support of nurses and the objective social support scale to measure the density of their social networks. The authors found that there was a moderate correlation between the two aspects of social support (r = 0.42). In addition, research on the social networks of entrepreneurs also found that the frequent contacts with members of the social network significantly correlated with the quality of the relational interaction (r = 0.31) (Pollack et al., 2016). Therefore, this study proposed the hypothesis (b): structural support significantly correlates with functional support.

Another theoretical basis for this study is the theory of socioemotional selectivity which predicts that with increasing age, people attach more importance to the quality of relationships (Carstensen, 1995). Accordingly, many studies have shown that functional support have a stronger prediction on loneliness than does structural support (e.g., Antonucci et al., 2014; Hawkley et al., 2008; Pinquart &

Sorensen, 2001; Routasalo et al., 2006). Despite both being related to loneliness, the quality of social network correlated more strongly with loneliness than did the quantity (Pinquart & Sorensen, 2001). Loneliness in older adults was found to be closely associated with expectations of and satisfaction with contacts with children and friends, but not with the frequency of these contacts (Routasalo et al., 2006). Another study found that when controlling for the influence of demographic information such as gender, age, and ethnicity, satisfaction with one's social network had stronger prediction on loneliness of older adults than did the social network size (Hawkley et al., 2008).

In conclusion, a higher level of structural support can predict a higher level of functional support, and functional support predicts loneliness better than structural support, so it is speculated that functional support may serve as an intermediary factor between structural support and loneliness. Empirical research has shown that functional support can be used as an intermediary, affecting individuals' depression and loneliness. For example, Fiori et al. (2006) used the perceived quality of social relations as an internal mechanism to explore its mediating role between social support type and depression. The results indicated that perceived quality of social relations partially mediated the association between network type and older adults' depressive symptomatology. Another study focused on the risk factors of loneliness in older adults, finding that satisfaction with their social relations partially mediated the association between the number of social relations and social loneliness (Heylen,

2010). Therefore, this study proposed the hypothesis (c): functional support mediates the relationship between structural support and loneliness.

Besides the close relationship between social support and loneliness, researchers have also paid close attention to the regional differences in social support and loneliness among older adults. The regional differences in loneliness were different in China and other countries. In other countries, many studies have found that rural elderly reported lower level of loneliness than did urban or urban-cluster elderly (Abel et al., 2016 in Uganda; Kaleigh et al., 2019 in the US; Paul et al., 2019 in New Zealand), or urban elderly (25.3%) had a higher proportion of "lonely" (the score of 3-item UCLA loneliness scale greater than 6 was classified as "lonely") than town/fringe elderly (21%) and village elderly (23.1%) (Victor & Pikhartova, 2020 in England), although two studies in Finnish have shown the opposite results (Savikko et al., 2005; Routasalo et al., 2006). However in China, study have found that living in a rural (as opposed to urban) area is a specific factor to the Chinese context and is associated with higher level of loneliness (Yang & Victor, 2008). Therefore, studies in China have consistently shown that rural elderly experienced more loneliness than urban elderly (e.g., Su et al., 2015; Wang & Zhou, 2010; Wei, 2012).

When it comes to social support, fewer studies investigated the regional differences of structural and functional support. Therefore, the social support referred below does not completely correspond to structural or functional support. Studies in the UK found that older adults in semi-rural and rural areas participated in more social activities and had stronger network structures (except in terms of friends) than did

those in urban areas (Bowling et al., 1995; Paykel et al., 2003). Similarly, Baernholdt and colleagues (2012) found that older adults in rural areas had larger family support networks but smaller friend and religious support networks than did those in rural-urban adjacent and urban areas. However, a study conducted in Iowa have found that there was no differences in the size of social network, the frequency of social interaction, the amount of instrumental support, and the subjective level of social support between urban and rural elderly (Evans, 2009).

In China, many studies used the Social Support Rating Scale (SSRS) to measure social support from objective and subjective dimensions (Xiao, 1994). Objective support measures an individual's living arrangement and sources of social support. Whereas subjective support refers to an individual's emotional experience and satisfaction of being respected and supported. It is measured by the closeness with family members, friends, and neighbours. Although objective support and structural support, and subjective support and functional support differ in definitions and are measured in different ways, we can roughly regard objective support as structural support and subjective support as functional support. Most studies have found that compared to rural elderly, urban elderly had higher level of objective (structural) support and subjective (functional) support (e.g., Gao et al., 2020; Mao et al., 2017; Wang et al., 2016). However, some studies found that objective (structural) support of rural elderly was significantly higher than that of urban elderly (Li et al., 2013; Zeng, 2006), and subjective (functional) support had no difference between urban and rural elderly (Zeng, 2006).

Because of the inconsistency of definitions and measurement tools, it is hard to draw a unified conclusion on the regional differences of structural and functional support in China. In addition, the way some studies simply divided the elderly into urban and rural groups may weaken the conclusion of these studies. In China, in order to facilitate administrative management, regions are divided into three categories: provincial, municipal, and county/town level (The Central People's Government of the People's Republic of China, 2005). Rural areas are generally subordinate to and managed by towns. Thus, some studies classified older adults who were investigated in town and rural areas into a single group as rural elderly (Li et al., 2013; Wang et al., 2016; Wang & Zhou, 2010; Zeng, 2006). However, the last two decades of urbanization in China have led to differences in rural, town, and urban politics, economies, cultures, and environments. It is possible that there are differences in social support and loneliness between town and rural elderly. Therefore, the differences of structural support, functional support, and loneliness among urban, town, and rural elderly in China are still unclear. Nevertheless, according to the previous literature, this study still proposed the hypothesis (d): urban elderly reported less loneliness than town and rural elderly, and the hypothesis (e): urban elderly had higher structural and functional support than town and rural elderly. Based on the hypotheses of this study, after testing the mediating effect of functional support, this study will further explore the regional differences of this mediating effect.

In sum, in the context of China's urbanization, this study explores the mediating role of functional support in the relationship between structural support and

loneliness in the elderly. To explore the regional differences of this mediating effect, we used a multigroup structural equation model (SEM) to compare the models among older adults in urban, town, and rural areas.

Method

Participants

Data collection commenced after obtaining ethical clearance to conduct the study from the School of Psychology, Fujian Normal University. This study employed summer college students to collect data. A group of 1,424 older adults were collected by means of convenience sampling. Participants were recruited from 11 provinces or province-level municipality in China, including Anhui, Beijing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Shanxi, Yunnan, and Zhejiang. All participants were asked to sign an informed consent form and then complete a questionnaire and face-to-face interview. Individuals had to: (1) be aged ≥ 60 years, (2) have no missing questions on their questionnaires, except those requesting demographic information. Of the total, 99 participants were excluded, thereby making the effective rate as high as 93%. The remaining 1,325 participants were distributed among urban (n = 393), town (n = 330), and rural (n = 602) areas, with a mean age of 69.27 years (*SD* = 6.92; age range = 60–97 years); 46.6% were male. Some participants did not respond to items about their demographic information, such as age (n = 2), gender (n = 6), education level (n = 2), living arrangement (n = 7), and economic satisfaction (n = 1).

Measures

Structural-functional social support scale: Almquist et al. (2017) were the first to extract nine items from two dimensions of the Interview Schedule for Social Interaction (ISSI; Henderson et al., 1980) to measure structural and functional social support. The four items of structural support were taken from the Availability of Social Integration on the ISSI. These included: (1) How many people who share your interests do you know and have contact with? (2) How many people do you know that you meet or talk to during a week? (3) How many friends do you have who can visit you in your home and feel “at home”? and (4) How many people can you speak openly with? For each of these items, the response options were: (1) None, (2) 1–2, (3) 3–5, (4) 6–10, (5) 11–15, and (6) More than 15. Higher mean scores indicated more structural support or a larger social network. The five items of functional support were extracted from the Availability of Attachment on the ISSI. These included: (1) There is someone special who I really feel supports me, (2) There is someone special who is close to me, (3) Others appreciate what I do for them, (4) There are people around me who I can easily ask for favours, and (5) There are other persons outside my family that are close to me and that I can turn to in times of hardship. The response options for each item were: (1) Disagree completely, (2) Disagree, (3) Agree, and (4) Agree completely. The higher the mean score, the higher the functional support people perceived. Measurement of functional support in this study was measured on five levels, with scores ranging from 1 to 5. A "Neither agree nor disagree" option was set in the middle to make the choices more in line with the Chinese cultural background (Lee et al., 2002; Si & Cullen, 1998; Zhao et al., 2017).

To ensure the validity of these items, this study used Amos 22.0 to construct a two-factor SEM for confirmatory factor analysis, which yielded the following outputs: χ^2_{51} = 185.807, *df* = 26, *p* < .001; χ^2_{51} / df = 7.147; TLI = 0.939; CFI = 0.956; PCFI = 0.690; RMSEA = 0.068 (CI_{90} = 0.059, 0.078), indicating the model was acceptable (Hu & Bentler, 1999). The Cronbach's α of structural and functional support in this study were 0.774 and 0.813, respectively.

The 3-item UCLA loneliness scale: The 3-item UCLA loneliness scale was compiled by Hughes et al. (2004). It contains only three items: (1) How often do you feel that you lack companionship? (2) How often do you feel left out? and (3) How often do you feel isolated from others? Participants respond regarding the frequency of the above experiences. The options include: (1) Hardly ever, (2) Some of the time, and (3) Often. Loneliness scores are between 3 and 9. The higher the score, the stronger the loneliness people feel. In this study, the Cronbach's α for the scale was 0.799.

Statistical analysis

All analyses were conducted using SPSS 19.0 and AMOS 22.0. Frequencies and cross-tabulations gave the distribution of socio-demographic variables, while means and standard deviations showed the scores of structural support, functional support, and loneliness in older adults in urban, town, and rural areas. A Pearson correlation was used to establish correlations, while a one-way ANOVA was employed to explore the regional differences among these study variables. A SEM with latent variables was used to evaluate whether functional support mediated the relationship between structural support and loneliness. Then, a SEM with a multigroup analysis

was used to assess the regional differences of the mediation models in urban, town, and rural elderly.

For the SEM, the χ^2 statistic is usually significant in large sample studies, often causing researchers to reject appropriate models that should be accepted (Kenny, 2015). Therefore, this study used other fit indices, including the comparative fit index (CFI), Tucker-Lewis index (TLI), and approximate root mean square error of approximation (RMSEA). A good model fit is achieved if the CFI and TLI values are above .90 and RMSEA value ranges from .05 to .08, providing a reasonable and appropriate fit (Kline, 2010). For the multigroup SEM, Akaike's Information Criterion (AIC) and the Expected Cross-validation Index (ECVI) were used to verify the measurement invariance across models in different regions. When multiple models in the results are fit, the model with the smallest AIC and ECVI values is the most suitable (Wu, 2010).

Results

Descriptive statistics

The data on the socio-demographics of participants by residence place are presented in Table 1. The mean ages of the different groups and total sample were all around 69 years, and nearly half of the total sample was female. For education level, about half (51.4%) of the total had primary school and below, with 27.3% and 21.2% having had secondary and high school (and above), respectively. Older adults in rural areas had a greater proportion (68.1%) of primary school and below than did older adults living in

cities (40.5%) and towns (33.9%). The majority of the sample (75.6%) was married, regardless of residence type. In terms of economic condition, 38.9% of the total sample rated their economic condition as “Satisfied” or “Very satisfied,” 15.4% rated it as “Dissatisfied” or “Very dissatisfied,” and 45.6% rated it as “Just so-so.” Among the three regions, a higher proportion of urban elderly reported satisfaction with their economic condition (51.9%) than did town and rural elderly (around 33% of older adults for both areas).

[Table 1 near here]

Table 2 shows the mean values of structural support, functional support, and loneliness in urban, town, and rural elderly. A one-way ANOVA showed that there were significant differences in the structural support of older adults among different regions, $F = 5.145$, $p = 0.006$. A post-hoc analysis using the least significant difference (LSD) test indicated that the level of structural support for town elderly was significantly lower than that of rural ($p = 0.002$) and urban ($p = 0.009$) elderly, but there was no significant difference between rural and urban elderly. Moreover, there was no significant difference in the functional support among the older adults dwelling in all three regions. Loneliness for each group differed significantly, $F = 30.694$, $p < .001$. A post-hoc analysis indicated that the loneliness of urban elderly was significantly lower than that of town ($p < .001$) and rural ($p < .001$) elderly, and the loneliness of rural elderly was significantly lower than that of town elderly ($p = .01$).

[Table 2 near here.]

Bivariate correlations

Table 3 presents the Spearman's correlations among the study variables. The results showed that structural and functional support were positively correlated with one another, and both were negatively correlated with loneliness. The results of a Fisher r-to-z transformation indicated that the correlation between structural support and loneliness in urban elderly was significantly lower than that of town and rural elderly (Zr = 2.06, p = .039).

[Table 3 near here.]

Mediation analysis of functional support

A SEM with mediation pathways was created to evaluate whether functional support represented mechanisms through which structural support might impact loneliness among older adults; this was accomplished by performing bootstrapping to calculate 95% bias-corrected confidence intervals for indirect effects.

The result showed that the total effect of structural support on loneliness (standardized total effect = -.290, p < .001) was significant. An indirect pathway existed between structural support and loneliness via functional support (standardized indirect effect = -.132, p = .005). The direct effect of structural support on loneliness (standardized direct effect = -.158, p = .005) was also significant in the mediation model, indicating that functional support partially mediated the relationship between structural support and loneliness. The model fit indices indicated an acceptable fit, χ^2_{51} = 241.939, p < .001, CFI = .962, TLI = .951, RMSEA = .053 (CI_{90} = .047, .060). The

size of the indirect effect via functional support was 83.54% (-.132 / -.158) of that direct effect. For more detail, see Figure 1.

[Figure 1 near here.]

Multigroup SEM: Measurement invariance

The regional differences of relationships among structural support, functional support, and loneliness were examined using SEM with a multigroup analysis. First, measurement invariance was verified by two models that gradually added constraints. Model 1 was a configural model with free paths between each group. The model fit indices indicated an adequate fit, χ^2 = 372.952, *df* = 153, CFI = .957, TLI = .944, RMSEA= .033 (CI_{90} = .029, .037), AIC = 606.952, ECVI = .459. Model 2 was a measurement weights model with equal factor loadings on all groups. The model fit indices were also acceptable, χ^2 = 401.398, *df* = 171, CFI = .955, TLI = .947, RMSEA = .032 (CI_{90} = .028, .036), AIC = 599.398, ECVI = .453. Comparisons across models showed that the increase in chi-squared values ($\Delta\chi^2$ = 28.446, *p* = .056) was not statistically significant and changes in other model fit indices were small, indicating robust measurement consistency across the urban, town, and rural groups used in this research. In this study, the model with the smaller AIC and ECVI values, i.e., the equal measurement weights model (Model 2) was used as the most suitable model in the subsequent multigroup analysis.

Multigroup comparison

According to residence place, the sample was divided into urban, town, and rural groups. The path coefficients of each model were compared by critical ratios for

differences (CRD) between parameters to explore regional differences in the mediating effect of functional support (see Table 4, Figure 2). If the CRD between parameters is greater than 1.96, the two parameters are significantly different (Jang & Kim, 2018). The results showed that: (1) functional support fully mediated the relationship between structural support and loneliness in urban elderly. The size of the indirect effect via functional support was 98.17% (-.107 / -.109) of that direct effect. However, (2) functional support partially mediated the impact of structural support on loneliness in older adults residing in town and rural areas. The mediation effect accounted for 66.81% and 85.16% of the total effect, respectively. (3) Comparing the path coefficients of the three models, it was determined that structural support for town elderly had a greater prediction on functional support than did the same support for rural elderly.

[Table 4 near here.]

[Figure 2 near here.]

Discussion

The purpose of this study was to examine the impact of structural support on loneliness and the mediation role of functional support in this relationship. Multigroup analysis was used to compare the mediation models among older adults in urban, town, and rural areas. The results showed that: (1) structural support for older adults in rural and urban areas was higher than for town elderly. Functional support showed no significant differences among older adults in the three regions. Loneliness of urban elderly was significantly less than that of town and rural elderly, and loneliness of

rural elderly was significantly less than that of town elderly. (2) In general, the impact of structural support on loneliness of older adults was partially achieved through functional support. The mediation effect accounted for 83.54% of the total effect. (3) There are regional differences in the mediating effect of functional support. Specifically, functional support for urban elderly fully mediated the relationship between structural support and loneliness. The mediation effect accounted for 98.17% of the total effect. However, functional support for older adults in town and rural areas partially mediated the impact of structural support on loneliness. The mediation effect accounted for 66.81% and 85.16% of the total effect, respectively.

This study found that urban elderly experienced less loneliness than did town and rural elderly, a conclusion that supported the hypothesis (d). This result is consistent with the results found in previous studies (e.g., Su et al., 2015; Wang & Zhou, 2010; Wei, 2012). The novel finding was rural elderly experienced less loneliness than did town elderly (the following explanation for regional difference of structural support can also explain this result). However, the regional differences of social support did not fully validate the hypothesis (e). Structural support for older adults in urban, town, and rural areas showed a V-shaped relationship that urban and rural elderly had higher structural support than town elderly, whereas functional support had no significant differences among the three groups. For the result of lower structural support in town elderly, we tried to explain it from the basis of social support in different regions. The social support in rural areas tends to be based on blood relationships, whereas the social support in urban areas tends to be based on

professional relationships (Zhu & Shao, 2005). However, due to the influence of urbanization, the blood relationships had been destroyed, while the professional relationships had not been fully established in towns (Cai, 2005; Li et al., 2012). Therefore, the structural support for town elderly was lower than that for urban and rural elderly. A recent study classifying respondents (who are not limited to the elderly) as living in rural, town, or urban areas found the same V-shaped relationship that compared with urban and rural residents, residents living in towns reported less social support (Wang et al., 2015), supporting the above explanation. However, inconsistent with the hypothesis (e), functional support had no differences among older adults living in urban, town, and rural areas. This result could be explained by the socioemotional selectivity theory, which proposed that older adults tend to pay more attention to more intimate and satisfying relationships than they did when they were younger (Carstensen, 1995). Therefore, no matter where older adults live, they tend to focus on the quality of their social support.

As for the relationship between social support and loneliness, this study found that functional support played a partial mediating role in the impact of structural support on loneliness. This result not only verified our hypotheses (a, b, and c), but also supported the prediction of the convoy model of social relations. As previous studies have shown, the size, composition, and frequency of social support can affect loneliness (e.g., Cheng et al., 2010; de Jong-Gierveld et al., 2015; Kemperman et al., 2019; Writtenborn et al., 2020). Therefore, structural support can directly predict loneliness in the elderly. Moreover, structural support can indirectly impact loneliness

via functional support. Higher structural support suggests that older adults may have multiple social roles in their social network and therefore can obtain more and higher-quality social connectedness and integration (Moen, 2001). Older adults can also gain a sense of belonging from their social identity (Dutton et al., 1994), eventually reducing their loneliness.

Furthermore, this study found the regional differences of the mediating effect. Specifically, functional support for urban elderly fully mediated, and for town and rural elderly partially mediated, the impact of structural support on loneliness. This result can be explained by social support for older adults in different regions relying on different social groups. Researchers have found that rural residents are more likely to seek support from spouses and relatives, while urban residents are more likely to seek support from friends and colleagues (Cai et al., 1997; Zhu & Shao, 2005). Despite changes stemming from reform and opening up, China's rural economy still considers the family to be the basic unit of social production. The strong economic relationship between family members collaborating in production increases their dependence on one another in all aspects of their daily lives (Cai et al., 1997). Many generations of rural families in China still live together under the same roof. Such a large-scale, long-term, stable social network can ensure that rural elderly have both a satisfactory quantity and quality of social support, jointly reducing their loneliness. Compared with the similarities found between urban and town elderly, town and rural elderly are closer in terms of living conditions such as employment opportunities,

income levels, living standards, etc. Therefore, the impact pattern of social support on loneliness is similar for town and rural elderly.

However, unlike rural and town households, urban households have lost the function of production. Urban residents are more inclined to obtain social support from professional ties (such as colleagues, friends, etc.) (Fang & Hu, 2003; Zhu & Shao, 2005). This suggests that urban residents' social support is easily affected by occupational changes. Compared with town and rural residents, urban residents, especially urban youth, have greater instability in terms of their employment and change their addresses more frequently (He, 1991). Therefore, the social networks of urban elderly are unstable and their social support structures are often destroyed. Faced with such situations, urban older adults often take the initiative, accepting and adjusting to their social networks and focusing their time and energy on cultivating higher-quality social support. Therefore, only when their social support based on professional ties is of a high quality is it possible to effectively relieve urban older adults' loneliness.

In addition, through a multigroup SEM, as compared to rural elderly, the structural support for town elderly was found to predict their functional support better. In other words, the same amount of structural support can provide town elderly with more psychological satisfaction than what would be experienced by rural elderly. The perceived discrepancy hypothesis of loneliness based on cognitive theory proposes that the degree of loneliness depends not only on actual social relations, but also on the individual's expectations of these relations (Perlman & Peplau, 1998). That is,

loneliness is a subjective feeling that occurs when there is a discrepancy between individuals' actual and expected social relations. To avoid loneliness and minimize this perceived discrepancy, people can not only modify their expectations on social relations, but also achieve sufficient social support to balance the two (Burholt et al., 2017). According to the results of the present study, compared to rural elderly, town elderly not only experienced more loneliness, but also had less structural support. In the face of this unfavourable situation, town elderly may actively adjust their expectations to reduce the discrepancy and give full value to everyone in their social network to meet their needs. Therefore, as opposed to rural elderly, the structural support of town elderly predicted their functional social support better. Of course, this inference needs to be verified in future research.

In conclusion, the current study demonstrates that functional support plays a mediating role in the relationship between structural support and loneliness. The importance of this study is the division of older adults into three categories, according to their place of residence. This work shows that older adults from different regions have different levels of structural support and loneliness, and the mediation model is different between urban and town/rural elderly. This study will help researchers better understand how different types of social support interact to decrease loneliness in older adults, suggesting that nursing strategies for older adults in different regions should be focused differently, with the emphasis on the function of social support and older adults living in towns.

Declaration of interest statement

No potential conflict of interest was reported by the authors.

References

Abel, N., James, N., & Gideon, R. (2016). Loneliness among older persons in Uganda: examining social, economic and demographic risk factors. *Ageing & Society*, *36*(4), 860–888. https://doi.org/10.1017/S0144686X15000112

Almquist, Y. B., Landstedt, E., & Hammarström, A. (2017). Associations between social support and depressive symptoms: Social causation or social selection—or both? *The European Journal of Public Health*, *27*(1), 84–89. https://doi.org/10.1093/eurpub/ckw120

Abel, N., James, N., & Gideon, R. (2016). Loneliness among older persons in Uganda: examining social, economic and demographic risk factors. *Ageing & Society*, *36*(4), 860-888. https://doi.org/10.1017/S0144686X15000112

Antonucci, T. C., Ajrouch, K. J., & Birditt, K. S. (2014). The Convoy Model: Explaining social relations from a multidisciplinary perspective. *The Gerontologist*, *54*(1), 82–92. https://doi.org/10.1093/geront/gnt118

Baernholdt, M., Yan, G., Hinton, I., Rose, K., & Mattos, M. (2012). Quality of life in rural and urban adults 65 years and older: Findings from the national health and nutrition examination survey. *Journal of Rural Health*, *28*(4), 339–347. https://doi.org/10.1111/j.1748-0361.2011.00403.x

Bowling, A., Farquhar, M., & Grundy, E. (1995). Changes in network composition among older people living in inner London and Essex. *Health & Place*, *1*(3), 149–166. https://doi.org/10.1016/1353-8292(95)00021-D

Burholt. V., Windle, G., & Morgan, D. J. (2017). A social model of loneliness: The roles of disability, social resources, and cognitive impairment. *The Gerontologist*, *57*(6), 1020–1030. https://doi.org/10.1093/geront/gnw125

Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. *Perspectives on Psychological Science*, *10*(2), 238–249. https://doi.org/10.1177/1745691615570616

Cacioppo, J. T., Hawkley, L. C., Crawford, L. E., Ernst, J. M., Burleson, M. H., Kowalewski, R. B., Malarkey, W. B., Cauter, E. V., & Berntson, G. G. (2002). Loneliness and health: Potential mechanisms. *Psychosomatic Medicine*, *64*(3), 407–417. https://doi.org/10.1097/00006842-200205000-00005

Cai, H., Ye, B., Kuang, Z., Zhuo, H. (1997). Comparison of intentions of social relations between urban residents and some rural residents of seeking social support. *Sociological research*, *12*(6), 10–17.

[蔡禾, 叶保强, 邝子文, 卓惠兴. (1997). 城市居民和郊区农村居民寻求社会支援的社会关系意向比较. *社会学研究*, *12*(6) , 10–17.]

Cai, Y. (2005). Change of farmer's moral concepts during urbanization. *Theoretic Observation*, *34*(4), 73–76.

[蔡应妹. (2005). 城镇化进程中农民思想道德观念的嬗变与超越. *理论观察*, *34*(4), 73–76.]

Carstensen, L. L. (1995). Evidence for a life-span theory of socioemotional selectivity. *Current Directions in Psychological Science*, *4*(5), 151–156. https://doi.org/10.1111/1467-8721.ep11512261

Chen, Y., & Feeley, T. H. (2014). Social support, social strain, loneliness, and well-being among older adults: An analysis of the health and retirement study. *Journal of Social & Personal Relationships*, *31*(2), 141–161. https://doi.org/10.1177/0265407513488728

Chen, Y., Hicks, A., & While, A. E. (2014). Loneliness and social support of older people in China: a systematic literature review. *Health & Social Care in the Community*, *22*(2), 113–123. https://doi.org/10.1111/hsc.12051

Cheng, S-T., Lee, C. K. L., & Chow, P. K. (2010). Social support and psychological well-being of nursing home residents in Hong Kong. *International Psychogeriatrics*, *22*(7), 1185–1190. https://doi.org/10.1017/S1041610210000220

Davidson, S. K., Dowrick, C. F., & Gunn, J. M. (2016). Impact of functional and structural social relationships on two year depression outcomes: A

multivariate analysis. *Journal of Affective Disorder*, *193*(6), 274–281. http://dx.doi.org/10.1016/j.jad.2015.12.025

de Jong Gierveld, J., Keating, N., & Fast, J. E. (2015). Determinants of Loneliness among Older Adults in Canada. *Canadian Journal on Aging / La Revue canadienne du vieillissement*, *34*(2), 125–136. https://www.muse.jhu.edu/article/581250.

Dutton, J. E., Dukerich, J. M., & Harquail, C. V. (1994). Organizational images and member identification. *Administrative Science Quarterly*, *39*(2), 239–263. https://doi.org/10.2307/2393235

Evans, R. J. (2009). A comparison of rural and urban older adults in Iowa on specific markers of successful aging. *Journal of Gerontological Social Work, 52*(4), 423–438. https://doi.org/10.1080/01634370802609197

Fang, X., Hu, S. (2003). An analysis on social support network for the move-to-town peasants. *Journal of Changsha Social Work College*, *3*, 1–5. doi: 10.3969/j.issn.1671-5136.2003.03.001

[方向新，胡双喜. (2003). 进镇农民的社会支持网探析. *长沙民政职业技术学院学报*, *3*, 1–5.]

Fiori, K. L., Antonucci, T. C., & Cortina, K. S. (2006). Social network typologies and mental health among older adults. *Journal of Gerontology: Psychological Sciences*, *61B*(1), 25–32. https://doi.org/10.1093/geronb/61.1.P25

Gallo, L. C., Fortmann, A. L., McCurley, J. L., Isasi, C. R., Penedo, F. J., Daviglus, M. L., Roesch, S. C., Talavera, G. A., Gouskova, N., Gonzalez, F., Schneiderman, N., & Carnethon, M. R. (2015). Associations of structural and functional social support with diabetes prevalence in U.S. Hispanics/Latinos: Results from the HCHS/SOL Sociocultural Ancillary Study. *Journal of Behavioral Medicine*, *38*(1), 160–170. https://doi.org/10.1007/s10865-014-9588-z

Gao, D., Zhang, A., & Dong, X. (2020). Status quo of social support for the elderly in Shanxi province and its impact on the quality of life. *Chinese Rural Health*

Service Administration, *40*(9), 669–675. doi: CNKI:SUN:ZNWS.0.2020-09-015

[高多多，张爱莲，董小燕. (2020). 山西省老年人社会支持现状及其对生命质量的影响. *中国农村卫生事业管理*, *40*(9), 669–675.]

Golden, J., Conroy, R. M., Bruce, I., Denihan, A., Greene, E., Kirby, M., & Lawlor, B. A. (2009). Loneliness, social support networks, mood and wellbeing in community-dwelling elderly. *International Journal of Geriatric Psychiatry*, *24*(7), 694–700. https://doi.org/10.1002/gps.2181

Green, L. R., Richardson, D. S., Lago, T., & Schatten-Jones, E. C. (2001). Network correlates of social and emotional loneliness in young and older adults. *Personality and Social Psychology Bulletin*, *27*(3), 281–288. https://doi.org/10.1177/0146167201273002

Hawkley, L. C., Hughes, M. E., Waite, L. J., Masi, C. M., Thisted, R. A., & Cacioppo, J. T. (2008). From social structural factors to perceptions of relationship quality and loneliness: The Chicago health, aging, and social relations study. *Journals of Gerontology: Social Sciences*, *63B*(6), 375–384. https://doi.org/10.1093/geronb/63.6.S375

He, Z. F. (1991). *Introduction to Community*. Guangzhou, China: Zhongshan University Press.

[何肇发. (1991), *社区概论*. 广州，中山大学出版社.]

Henderson, S., Duncan-Jones, P., Byrne, D. G., & Scott, R. (1980). Measuring social relationships: The interview schedule for social interaction. *Psychological Medicine*, *10*(4), 723-734. https://doi.org/10.1017/S003329170005501X

Heylen, L. (2010). The older, the lonelier? Risk factors for social loneliness in old age. *Ageing and Society*, *30*(07), 1177–1196. https://doi.org/10.1017/S0144686X10000292

Holwerda, T. J., Beekman, A. T. F., Deeg, D. J. H., Stek, M. L., van Tilburg, T. G., Visser, P. J., Schmand, B. A., Jonker, C., & Schoevers, R. (2012). Increased risk of mortality associated with social isolation in older men: Only when

feeling lonely? Results from the Amsterdam Study of the Elderly (AMSTEL). *Psychological Medicine*, *42*(4), 843–853. https://doi.org/10.1017/S0033291711001772

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging*, *26*(6), 655–672. https://doi.org/10.1177/0164027504268574

Jang, M., & Kim, J. (2018). A structural model for stress, coping, and psychosocial adjustment: A multi-group analysis by stages of survivorship in Korean women with breast cancer. *European Journal of Oncology Nursing*, *33*, 41–48. https://doi.org/10.1016/j.ejon.2018.01.004

Kaleigh, L., Alexandra, G., & Julie, R. (2019). Exploring the effects of rural and urban living on loneliness and reinstitutionalization. *Innovation in Aging*, *3*(Suppl_1), 533–534. https://doi.org/10.1093/geroni/igz038.1961

Kemperman, A., Van den Berg, P., Weijs-Perrée, M., & Uijtdewillegen, K. (2019). Loneliness of older adults: Social network and the living environment. *International Journal of Environmental Research and Public Health*, *16*(3), 406. https://doi.org/10.3390/ijerph16030406

Kenny, D. A. (2015). Measuring model fit. Retrieved from http://davidakenny.net/cm/fit.htm

Killeen, C. (1998). Loneliness: An epidemic in modern society. *Journal of Advanced Nursing*, *28*(4), 762–770. https://doi.org/10.1046/j.1365-2648.1998.00703.x

Kline, R. B. (2010). *Principles and practices of structural equation modeling* (3rd ed.). New York: Guilford.

Lakey, B., & Cohen, S. (2000). Social support theory and measurement. In S. Cohen, L. G. Underwood & B. H. Gottlieb (Eds.), *Social support measurement and*

intervention: A guide for health and social scientists (pp. 29–52). Oxford: Oxford University Press.

Lee, J. W., Jones, P. S., Mineyama, Y., & Zhang, X. E. (2002). Cultural differences in responses to a Likert scale. *Research in Nursing & Health*, *25*(4), 295–306. https://doi.org/10.1002/nur.10041

Lehto-Järnstedt, U. S., Ojanen, M., & Kellokumpu-Lehtinen, P. (2004). Cancer-specific social support received by newly diagnosed cancer patients: Validating the new Structural-Functional Social Support Scale (SFSS) measurement tool. *Supportive Care in Cancer*, *12*(5), 326–337. https://doi.org/10.1007/s00520-004-0620-7

Li, Q., Chen, Y., & Liu, J. (2012). A study of "progression pattern" in Chinese urbanization. *Social Sciences in China*, *7*, 82–100.

[李强，陈宇琳，刘精明. (2012). 中国城镇化 "推进模式" 研究. *中国社会科学*, *7*, 82–100.]

Li, Y., Tang, X., Cao, G., Zhang, D., Wen, Y., Zhao, K., Luo, Y., Cheng, X., Zhou, J. (2013). Analysis of social support and its related factors among healthy elderly people in Chongqing. *Journal of Third Military Medical University*, *35*(2), 175–177.

[李远，谭小林，曹国兴，张代江，文晏，赵科，罗英茂，程雪，周建初. (2013). 重庆地区健康老年人群社会支持状况及其相关因素分析. *第三军医大学学报*, *35*(2), 175–177.]

Mao, D., Su, H., Zhou, Y., & Wang, L. (2017). Comparative study on the relationship between depression and personality and social support of urban and rural empty-nest elderly. *Chines Journal of Practical Nursing*, *33*(1), 2–7. doi: 10.3760/cma.j.issn.1672-7088.2017.01.001

[毛丹旦，苏红，周郁秋，王丽娜. (2017). 城乡空巢老年人抑郁状况与人格特征，社会支持关系的比较研究. *中国实用护理杂志*, *33*(1), 2–7.]

Moen, P. (2001). The gendered life course. In R. H. Binstock (Ed.), *Handbook of aging and the social sciences* (5th ed., pp. 179–196). San Diego, CA: Academic Press.

Montes-Berges, B., & Augusto, J. M. (2007). Exploring the relationship between perceived emotional intelligence, coping, social support and mental health in nursing students. *Journal of Psychiatric and Mental Health Nursing*, *14*(2), 163–171. https://doi.org/10.1111/j.1365-2850.2007.01059.x

Paul, B., Sally, K., & Hamish, J. (2019). Ageing, loneliness, and the geographic distribution of New Zealand's interRAI-HC cohort. *Social Science & Medicine*, *227*, 84–92. https://doi.org/10.1016/j.socscimed.2018.08.002

Paul, C., Ayis, S., & Ebrahim, S. (2006). Psychological distress, loneliness and disability in old age. *Psychology, Health & Medicine*, *11*(2), 221–232. https://doi.org/10.1080/13548500500262945

Paykel, E. S., Abbott, R., Jenkins, R., Brugha, T. S., & Meltzer, H. (2003). Urban-rural mental health differences in Great Britain: Findings from the national morbidity survey. *International Review of Psychiatry*, *15*(1–2), 97–107. https://doi.org/10.1080/0954026021000046001

Perlman, D., & Peplau, L. A. (1998). Loneliness. In H. Friedman (Ed.), *Encyclopedia of mental health* (Vol. 2, pp. 571–581). San Diego, CA: Academic Press.

Perissinotto, C. M., Cenzer, I. S., & Covinsky, K. E. (2012). Loneliness in older persons: A predictor of functional decline and death. *Archives of Internal Medicine*, *172*(14), 1078–1084. https://doi.org/10.1001/archinternmed.2012.1993

Pinquart, M. & Sorensen, S. (2001). Influence on loneliness in older adults: A meta-analysis. *Basic and Applied Social Psychology*, *23*(4), 245–266. https://doi.org/10.1207/S15324834BASP2304_2

Pollack, J. M., Rutherford, M. W., Seers, A., Coy, A. E., & Hanson, S. (2016). Exploring entrepreneurs' social network ties: Quantity versus quality. *Journal of Business Venturing Insights*, *6*, 28–35. https://doi.org/10.1016/j.jbvi.2016.09.001

Routasalo, P. E., Savikko, N., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2006). Social contacts and their relationship to loneliness among aged people – a population-based study. *Gerontology*, *52*(3), 181–187. https://doi.org/10.1159/000091828

Savikko, N., Routasalo, P., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2005). Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*, *41*(3), 223–233. https://doi.org/10.1016/j.archger.2005.03.002

Sherbourne, C. D., & Stewart, A. L. (1991). The MOS social support survey. *Social Science & Medicine*, *32*(6), 705–714. https://doi.org/10.1016/0277-9536(91)90150-B

Si, S., & Cullen, J. B. (1998). Response categories and potential cultural bias: Effects of an explicit middle point in cross-cultural surveys. *The International Journal of Organizational Analysis*, *6*(3), 218–230. https://doi.org/10.1108/eb028885

Stokes, J. P. (1985). The relation of social network and individual difference variables to loneliness. *Journal of Personality and Social Psychology*, *48*(4), 981–990. https://doi.org/10.1037/0022-3514.48.4.981

Su, H., Wang, L., Zhou, Y., & Cao, Y. (2015). Comparative study on the relationship between loneliness and the quality of life of urban and rural absent parents in the Inner Mongolia Autonomous Region. *Chines Journal of Practical Nursing*, *31*(12), 926–930. doi: 10.3760/cma.j.issn.1672-7088.2015.12.021

[苏红，王丽娜，周郁秋，曹佳颖. (2015). 内蒙古自治区某地城乡空巢老年人孤独感与生命质量关系的比较研究. *中国实用护理杂志*, *31*(12), 926–930.]

The Central People's Government of the People's Republic of China. (2005). *Administrative division of the People's Republic of China*. http://www.gov.cn/test/2005-06/15/content_18253.htm

[中华人民共和国中央人民政府. (2005). *中华人民共和国行政区划*. http://www.gov.cn/test/2005-06/15/content_18253.htm]

Victor, C. R., & Pikhartova, J. (2020). Lonely places or lonely people? Investigating the relationship between loneliness and place of residence. *BMC Public Health*, *20*(1), 1–12. https://doi.org/10.1186/s12889-020-08703-8

Wang, F., Li, S., Bai, X., Ren, X., Rao, L., Li, J., Liu, H., Liu, H., Wu, B., & Zheng, R. (2015). Town mouse or country mouse: identifying a town dislocation effect in Chinese urbanization. *PLOS ONE, 10(5),* e0125821. https://doi.org/10.1371/journal.pone.0125821

Wang, R., Guo, J., Zhang, H., Li, M., Hu, S., Zhuang, L., Luo, S., & Dong, Y. (2016). Studying on the influence of social support on mental health of the elderly in Shandong. *The Chinese Health Service Management*, *33*(3), 217–220.

[王瑞梅，郭继志，张涵，李敏，胡善菊，庄立辉，罗盛，董毅. (2016). 山东省老年人社会支持状况对心理健康的影响. *中国卫生事业管理*, 33(3), 217–220.]

Wang, X., & Zhou, H. (2010). The relationships of quality of life, loneliness and subjective well-being of the elderly. *Chinese Journal of Gerontology*, *30*(5), 676–677. doi: 10.3969/j.issn.1005-9202.2010.05.043

[王希华，周华发. (2010). 老年人生活质量、孤独感与主观幸福感现状及相互关系. *中国老年学杂志*, *30*(5), 676–677.]

Wei, P. (2012). Loneliness of the elderly and its influencing factors. *Journal of Social Work*, (10), 71-74. doi: 10.3969/j.issn.1672-4828.2012.10.020

[韦璞. (2012). 老年人孤独感差异及影响因素分析. *社会工作*, (10), 71-74.]

Wittenborn, A. K., Natamba, B. K., Rainey, M., Zlotnick, C., & Johnson, J. (2020). Suitability of the multidimensional scale of perceived social support as a measure of functional social support among incarcerated adults with major depressive disorder. *Journal of Community Psychology*, *48*(3), 960–976. https://doi.org/10.1002/jcop.22315

Wu, M. (2010). *Structural equation model-AMOS's operation and application.* Chongqing, China: Chongqing University Press.

[吴明隆. (2010). *结构方程模型-AMOS 的操作与应用*. 重庆：重庆大学出版社]

Xiao, S. (1994). The theoretical basis and research application of Social Support Rating Scale. Journal of Clinical Psychiatry, *4*(2), 98–100. Doi: CNKI:SUN:LCJS.0.1994-02-019

[肖水源. (1994). 《社会支持评定量表》的理论基础与研究应用. *临床精神医学杂志*, *4*(2), 98–100.]

Yang, K., & Victor, C. R. (2008). The prevalence of and risk factors for loneliness among older people in China. *Ageing & Society*, *28*(3), 305–327.

Zeng, C. (2006). Association between mental health and social support of the elderly in the urban and rural community of Lishui city. *Chinese Journal of Clinical Rehabilitation*, *10*(22), 174–176.

Zhang, X., & Silverstein, M. (2020). Family solidarity, social support, loneliness, and well-being among older adults in rural China. *Innovation in Aging*, *4*(Suppl_1), 319–320. https://doi.org/10.1093/geroni/igaa057.1023

Zhao, L., Xu, Y., Su, Y., Lu, F., Yang, J., Hu, C., Xu, C., & Yin, P. (2017). A study on the tendency of neutral middle point selection in the health life expectancy rating scale. *Journal of Public Health and Preventive Medicine*, *28*(6), 104–106. doi: CNKI:SUN:FBYF.0.2017-06-030

[赵露，徐勇，苏拥军，鲁芳芳，杨佳娟，胡池，徐承中，尹平. (2017). 健康期望寿命等级量表中中性中间点选择的倾向性研究. *公共卫生与预防医学*, *28*(6), 104–106.]

Zhu, Y., & Shao, T. (2005). Social relation's support of the transfer of China's rural labor forces. *Journal of Anhui Agricultural University (social science edition)*, *14*(5), 84–85. doi: 10.3969/j.issn.1009-2463.2005.05.023

[朱业乾，邵同尧. (2005). 我国农村劳动力转移的社会关系支持. *安徽农业大学学报: 社会科学版*, *14*(5), 84–85.]

Table 1. Demographic Characteristics of Older Adults in Urban, Town, and Rural Areas.

Socio-demographics	Urban (N = 393; 29.7%)	Town (N = 330; 24.9%)	Rural (N = 602; 45.4%)	Total (N = 1,325; 100%)
Age (*M* ± *SD*)	69.57 ±7.47	69.18 ±6.62	69.12 ±6.72	69.27 ±6.92
Female	202 (51.4%)	168 (50.9)	331 (55.0%)	701 (52.9%)
Education Level *				
Primary school and below	159 (40.5%)	112 (33.9%)	410 (68.1%)	681 (51.4%)
Secondary school	104 (26.5%)	131 (39.7%)	126 (20.9%)	361 (27.3%)
High school and above	129 (32.8%)	86 (26.1%)	66 (11.0%)	281 (21.2%)
Married (including remarriage)	299 (76.1%)	242 (73.3%)	460 (76.4%)	1001 (75.6%)
Economic satisfaction *				
Very dissatisfied	7 (1.8%)	9 (2.7%)	15 (2.5%)	31 (2.3%)
Dissatisfied	32 (8.1%)	49 (14.9%)	92 (15.3%)	173 (13.1%)
Just so-so	150 (38.2%)	164 (49.7%)	290 (48.2%)	604 (45.6%)
Satisfied	168 (42.8%)	95 (28.8%)	179 (29.6%)	442 (33.3%)
Very satisfied	36 (9.2%)	13 (3.9%)	26 (4.3%)	75 (5.7%)

Note. * indicates a significant difference (p < .001) among urban, town, and rural older adults, based on a chi-squared test; Percentages may not add up to 100 due to missing data.

Table 2. Structural Social Support, Functional Social Support, and Loneliness of Older Adults by Region.

Variable	Urban (n = 393)	Town (n = 330)	Rural (n = 602)	*F*
Structural social support (0-5)	3.33 ± .97	3.15 ± .83	3.35 ± .98	5.145**
Functional social support (1-5)	3.67 ± .63	3.60 ± .60	3.63 ± .61	1.494
Loneliness (3-9)	4.47 ± 1.63	5.38 ± 1.61	5.09 ± 1.66	30.694***

Note. $^{**}p < .01$; $^{***}p < .001$.

Table 3. Correlations among Structural Social Support, Functional Social Support, and Loneliness in Older Adults by Region.

Variable	Structural social support	Functional social support
Structural social support	1	
Functional social support	.35** (.37**, .39**, .32**)	1
Loneliness	-.22** (-.13*, -.28**, -.24**)	-.30** (-.22**, -.33**, -.32**)

Note. Values outside the parenthesis represent the correlation coefficients of the whole sample; values inside the parenthesis represent the correlation coefficients of the samples from urban, town, and rural areas. $^{*}p < .05$, $^{**}p < .01$.

Table 4. Standardized Path Coefficients in SEM for Older Adults in Urban, Town, and Rural Areas.

Path	Path coefficient		CRD
	Urban	Town	
SSS → FSS (total effect)	.471***	.496***	.964
FSS → Loneliness	-.228**	-.289**	-.582
SSS → Loneliness (direct effect)	-.109	-.214*	-1.386
SSS → FSS → Loneliness (indirect effect)	-.107**	-.143**	
	Town	Rural	
SSS → FSS (total effect)	.496***	.396***	-2.086
FSS → Loneliness	-.289**	-.334**	-.532
SSS → Loneliness (direct effect)	-.214*	-.155**	.847
SSS → FSS → Loneliness (indirect effect)	-.143**	-.132***	
	Urban	Rural	
SSS → FSS (total effect)	.471***	.396***	-1.221
FSS → Loneliness	-.228**	-.334**	-1.272
SSS → Loneliness (direct effect)	-.109	-.155**	-.825
SSS → FSS → Loneliness (indirect effect)	-.107**	-.132***	

Note. SSS = Structural social support; FSS = Functional social support; CRD = Critical ratios for differences between parameters; *p < .05, **p < .01, ***p < .001.

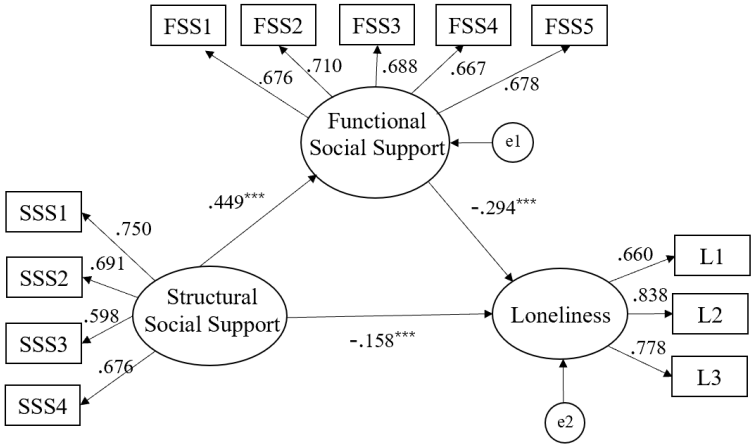

Figure 1. Mediation model showing the relationship between structural social support and loneliness as mediated by functional social support.

Note. *** $p < .001$. SSS = Structural Social Support; FSS = Functional Social Support.

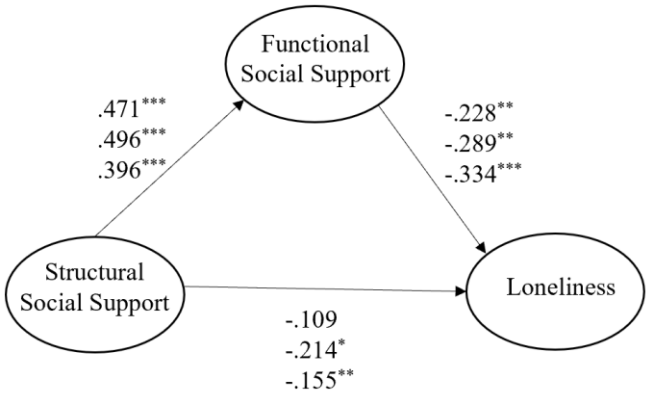

Figure 2. Mediation models for urban, town, and rural areas.

Note. The three values from top to bottom on each path represent parameters corresponding to the urban, town, and rural models; *p < .05, **p < .01, ***p < .001.